— University of Mosul —
College of Petroleum & Mining Engineering

Properties of Petroleum Products

Lecture 4

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8- Diesel index (DI):

Aniline point is used to determine another important property for the expression of paraffin and aromatic content for some petroleum fractions. This is called the diesel index that links the relationship between the aniline point and the API gravity.

Diesel index is a number indicate to favors auto-ignition of diesel engines. The diesel fuel considered is best with high diesel index. Diesel index calculated from the following formula:

$$\mathbf{DI = (API)\ (\ 1.8AP + 32)\ /\ 100}$$

Where: AP is the aniline point in ^{o}C.

9- Cetane Index and Cetane Number:

The cetane number is a measure of the ignition quality of a diesel fuel, and it is essentially the opposite of the octane number. The cetane number is the volume and percentage of pure cetane (n-hexadecane) in a blend of cetane and alpha methyl naphthalene which is equivalent the same ignition quality (delay period) of a diesel fuel being tested. This quality is specified for middle distillate fuels.

Cetane index means the arithmetic coefficient by which can de calculated cetane index from other properties is the API gravity and mid-point distillation . One of the standard tests is ASTMD976.

Delay period : is the time period between the start of injection and start of combustion (ignition) of the fuel.

The calculated cetane index is determined from the following equation:

Calculated cetane index (CCI) =

$$\mathbf{CCI=454.74-1641.416SG+774.74SG^2-0.554T_{50}+97.803(\log T_{50})^2 \ldots(1)}$$

Where: T_{50} is the ASTMD 86 temperature at 50% point in ^oC.

mid-boiling temperature ^oC, determined by Test Method D86 and corrected to standard barometric pressure.

Or/

Calculated cetane index =

$$\mathbf{-420.34+0.016G^2+0.192G\log T_{50}+65.01(\log T_{50})^2- 0.0001809(T_{50})^2 \ldots(2)}$$

Where:

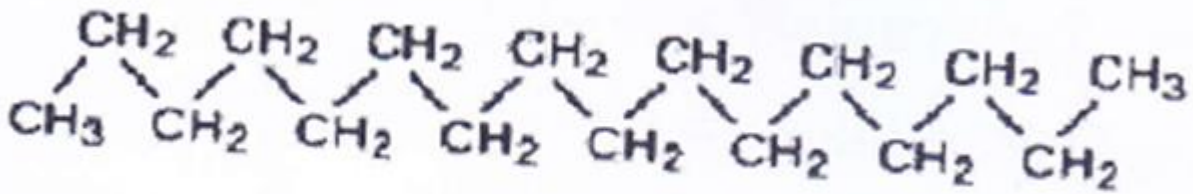
G= API Degrees at 60^oF.

T_{50} = D86 Temperature at 50% volume, in ^oF.

Differences between Octane Number and Cetane Number

Cetane number (diesel fuel) and octane number(gasoline) both measure the tendency of the fuel to ignite spontaneously . In the cetane number scale, high values represent fuels that ignite readily and, therefore, perform better in a diesel engine . In the octane number scale , high values represent fuels that resist spontaneous ignition and, therefore, have less tendency to knock in a gasoline engine. Because both scales were developed so that higher number represent higher quality for the respective use, high cetane number fuels have low octane numbers, and vice versa.

n-Hexadecane



Hexadecane (celane), cetane number = 100